

SWINE HEALTH FILES

SUMMARY



seconds

- Cell-mediated immunity is essential for fighting off PCV2 that has invaded cells.
- In a controlled study, Zoetis researchers evaluated cell-mediated immunity in pigs that were vaccinated with one of two PCV2 vaccines then challenged with virulent PCV2d.
- Fostera® Gold PCV MH, a new vaccine with two PCV2 genotypes, induced the best cell-mediated immune response.

New PCV2 vaccine for swine elicits strong cell-mediated immune response

A new porcine circovirus type 2 (PCV2) vaccine from Zoetis produces a robust and lasting cell-mediated immune response — the type of response that's essential for protecting pigs against PCV2 disease.

Zoetis researchers evaluated cell-mediated immunity in pigs vaccinated with Fostera® Gold PCV MH,¹ the new vaccine that protects against *Mycoplasma hyopneumoniae* (*M. hyo*) in addition to PCV2. They compared results to those from pigs given another commercial PCV2 vaccine and to control pigs that received only saline. The groups were treated as follows:

- Fostera Gold PCV MH split dose: 1 ml at 3 and 6 weeks of age
- Fostera Gold PCV MH one dose: 2 ml at 3 weeks of age
- Circumvent® PCV-M G2 split dose: 1 ml at 3 and 6 weeks of age
- Controls: 1 ml saline at 3 and 6 weeks of age

Three weeks after the last vaccination was administered, pigs were challenged with virulent PCV2d because it's the most prevalent PCV2 genotype in US herds.²

HIGHER T CELL RESPONSE

"Pigs in both groups vaccinated with Fostera Gold PCV MH had a higher T cell response than pigs vaccinated with Circumvent PCV-M G2 (Figure 1)," said Maria Cristina Venegas Vargas, DVM, PhD, manager, Global Biologics Research, Zoetis.

"In contrast, Circumvent PCV-M G2 induced very little detectable cell-mediated immunity," she reported. ➤



“A higher T cell response after vaccination is associated with a longer duration of immunity,³ which is especially important with persistent viruses like PCV2.”

MEGGAN BANDRICK, DVM, PHD
ZOETIS

Meggan Bandrick, DVM, PhD, senior manager, Global Biologics Research, Zoetis, explained that “a higher T cell response after vaccination is associated with a longer duration of immunity,³ which is especially important with persistent viruses like PCV2.”

The new vaccine’s duration of immunity against PCV2 is 23 weeks, she said, and noted that the vaccine’s duration of immunity against *M. hyo* is also 23 weeks.⁴

Cell-mediated immunity was evaluated with an enzyme-linked immunosorbent spot assay. The assay detected the number of lymphocytes isolated from blood that responded to the vaccines by secreting the cytokine interferon gamma (IFN- γ) when exposed to PCV2 antigen. “The strength of the PCV2-specific, IFN- γ response correlates with protective immunity,” she said.

Serology demonstrated that pigs vaccinated with either regimen of Foster Gold PCV MH or the other vaccine developed antibodies against PCV2, as expected, Bandrick noted.

WHY CELL-MEDIATED IMMUNITY MATTERS

Assessments of vaccine responses tend to focus on antibody response, also known as humoral immunity, instead of cell-mediated immunity — often because antibodies are easier to measure. However, both types of immunity are important, the scientist continued.

“Antibodies, which are made from B cells, recognize and help neutralize circulating virus, but they can’t get to viruses that have gotten into cells. That’s where cell-mediated immunity comes in. T cells not only help B cells produce effective antibodies, they kill virus-infected cells and help clear infection,” she said.

ADJUVANTS DIFFER

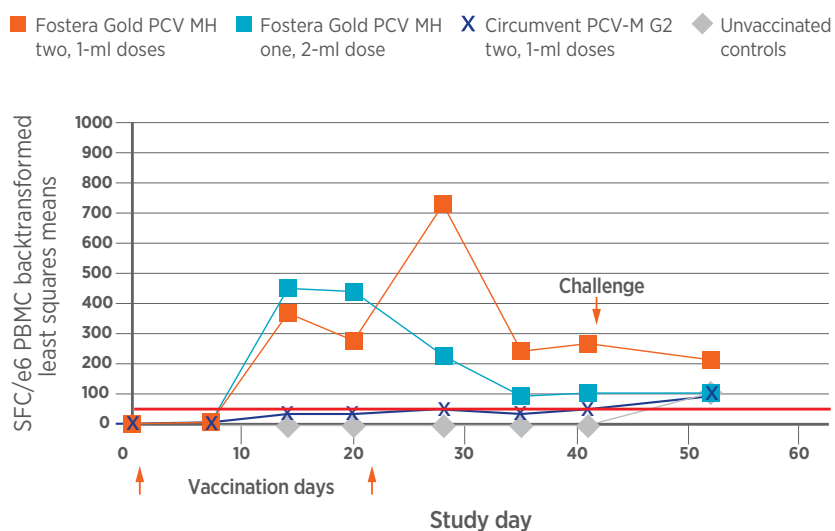
Why one vaccine induces stronger cell-mediated immunity than another is largely due to the vaccine’s adjuvant — the substance added to vaccines to boost the immune response, Bandrick continued.

“The adjuvant in Foster Gold PCV MH is MetaStim®, which elicits an antibody response as well as a strong cell-mediated response. It’s also smooth and injection-site reactions to the vaccine are rare and negligible,” she said. ➤

The new vaccine's duration of immunity against PCV2 is 23 weeks.

- 1 Venegas Vargas C, Taylor L, Foss D, et al. Evaluation of Cell Mediated Immunity Following PCV2+MH Vaccination and PCV2d Challenge. Poster 76. 2018 Allen D. Leman Swine Conference.
- 2 Personal communication between Darin Madson, DVM, PhD, Iowa State University, and Rick Swalla, DVM, Zoetis.
- 3 Pulendran B, et al. Review: Translating Innate Immunity into Immunological Memory: Implications for Vaccine Development. *Cell*. 2006;124:849-863.
- 4 Company data - Study Report No. B824R-US-15-505.
- 5 Galina L, Cowles B, Amodie D, et al. Evaluation of a novel PCV + *M hyopneumoniae* vaccine in swine experimentally challenged with PCV2d and *M hyopneumoniae* under commercial conditions. Proceedings of the 49th Annual Meeting of the American Association of Swine Veterinarians (AASV). March 3-6, 2018.
- 6 Personal communication between André Broes, DVM, Biovet, and Josée Daigneault, DVM, Zoetis.
- 7 Bandrick MM, Foss DL, Desai P, et al. EpiCC analysis of T cell epitope overlap among PCV2 vaccine and field strains. Poster I-250. 25th International Pig Veterinary Society Congress (IPVSC). 2018 International PRRS Symposium.

FIGURE 1_Cell-mediated immune response in pigs vaccinated against PCV2 then challenged with PCV2d



* Vaccination induced a biologically relevant CMI response if above 50 SFC/10e6 PBMC. Post-challenge, PCV2-specific T cells move into the tissues and out of the blood to protect against PCV2 infection.

“Besides MetaStim, the new vaccine contains PCV2a and 2b. It’s the only commercial vaccine in the US and Canada with two PCV2 genotypes, and its efficacy against 2d was demonstrated in a large field trial.”⁵ PCV2b and 2a are the most prevalent PCV2 genotypes circulating in Canada, followed by PCV2d.⁶

“Research with over 160 known PCV2 strains indicated that a vaccine with two PCV2 genotypes should provide broad coverage against current and circulating PCV2 viruses,”⁷ Bandrick said.

“Fostera Gold PCV MH has several strong characteristics. It will provide broad genotype coverage, induce a robust cell-mediated response and has a duration of immunity that lasts through the production stage. These attributes provide pork producers with excellent protection against PCV2 disease,” she said.